



Georgia Statewide Transportation Plan and Process

*Task 2.2 Existing Information
Systems Inventory*

final technical memorandum

prepared for

Georgia Department of Transportation

prepared by

Cambridge Systematics, Inc.

February 2000

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1.0 Introduction

This memorandum covers work plan subtask 2.2 – “an inventory of existing data sources and tools.” It builds upon the Subtask 2.1 technical memorandum – “an issues framework” – by incorporating edits received by GDOT reviewers and additional information obtained by contacted GDOT staff to fill in the blanks from the earlier memorandum. This memorandum consists of two parts:

- Table 1 provides a complete inventory of existing GDOT tools and systems; and
- Appendix A provides an example of how CS proposes to use GDOT’s existing information tools to construct a “system of tools” to support the SWTP. The sample area chosen was travel demand forecasting. This sample is not intended to be complete at this point, but rather is included to demonstrate how the next task will be approached.

This memorandum is the final preparatory step in undertaking Task 2.3 – “development of an integrated data and tools system to support this project.”

Table 1. Systems and Data Resources Overview

Systems/Data Resources	Source/Contact	Current Status	Notes	Next Step
Asset Management CS Team Leader: <i>Allen Marshall</i>				
Bridges – BIMS and Pontis	Bridge Office, Brian Summers, Norm Creszman, Ted Kowal	Standard bridge inventory and condition information available, updated on an ongoing basis. Very little needs projection is currently done. There is little integration between BIMS and the RC file, just traffic counts and bridge IDs.	Pontis not used for needs generation, but planned. Condition data collected at element level. A copy of the BIMS database could be easily provided as a Microsoft Access file.	Determine need for Bridge database information and, if necessary, request copies.
PACFS (Pavement Condition Evaluation System)	Norm Creszman	Every on-system road segment is rated annually. The RC file provides traffic counts and milepoints. The RC file has room for PACES information, but this is currently not maintained. Ratings go back 15 years.	Needs projection is not currently done, but a study of possible prediction models was conducted a year ago, led by Rick Deaver of the GDOT Lab. A computerized PACES file (CoPACES, in Microsoft Access) was one of the products of this study.	Determine the need for Pavement rating information
Roadway Characteristics (RC file)	OIS (Tim Christian, John Crown)	Documentation available from OIS. Information requests from the RC file can comprise any combination of data items, any geographic area, and any subset of roadway types. The RC file averages a five-year update schedule.	Toward the end of the year, GDOT hopes to have the RC file fully transitioned to Oracle. Until then, specific requests must be made to Tim Christian to receive any portion of the RC file. Turnaround time for information requests will typically be one or two weeks.	GDOT typically must develop a special querying program for each request, so requests should be considered carefully in order to minimize the number of queries that must be made. (One comprehensive request would be preferred by GDOT.)
HPMS	OIS (Tim Christian, John Crown, David Spilman, Mark Adams)	Information available on Federal report/tape, extract from RC file. Includes data not in the RC file.	Standard HPMS data available. This system is being reworked and will be a part of the new TIS using Oracle. Two-year timeframe	Determine relevance of HPMS to SWTP, evaluate need for HPMS forecasts.
Travel Demand Forecasts CS Team Leader: <i>Dan Beagan</i>				
Traffic Count System	OIS (Tim Christian, John Crown)	Traffic information is available from data retrieval system. Selected traffic information can be mapped.	Traffic counts have been conducted in accordance with the FHWA's Traffic Monitoring Guide. The majority of counts are samples taken on a three to five-year cycle for use in developing traffic summaries by functional class. Continuous traffic counting stations are used on higher facilities. Given the sampling methods, the SWTP update should be limited to continuous stations, and functional classification summaries.	Identify key corridors that will be examined in the SWTP and develop traffic tends for these corridors.

Table 1. Systems and Data Resources Overview (continued)

Systems/Data Resources	Source/Contact	Current Status	Notes	Next Step
<i>Travel Demand Forecasts(continued)</i>				
Urban Area Forecasts	Office of Planning: Urban Area Planning Bureau (Chris Simons)	GDOT has functioning Travel Demand Forecasting Models in each of the 11 MPOs. GDOT maintains 10 of the TDF models. ARC maintains the Atlanta model. TnDOT maintains the Georgia portion of the Chattanooga model. There are also working models for Hall and Lowndes Counties.	Models are three-step models (excluding mode choice) in all regions except Atlanta. Most models produce only daily highway volume forecasts. All produce highway volumes by link and revised link speeds. Most models either produce or will soon produce 2025 forecasts. The software used is TP+ or TRANPLAN. Trip generation equations have been obtained from GDOT. Standard equations are being implemented in all urban areas, except Atlanta and these equations could be used in forecasting future travel demand for the SWTP.	A simplified procedure for forecasting statewide VMT based on population and employment has been proposed and forwarded to Chris Simons of GDOT for his review.
Commuter Rail Model	Office of Intermodal Planning (Larry Saben, PBQ&D)	TDF model for ridership projections in 50-county area centered on Atlanta.	Model only forecasts home-based work trips. The larger area covered by the Commuter Rail Model makes it incompatible with the urban area models. Trips that are classified as home-based work trips in the commuter model are classified as home-based work, internal external work trips and external trips in the urban area models.	The commuter rail model is suitable to be directly used in the SWTP preparation, but its results should be checked for general consistency of trends.
InterCity Rail Model	Office of Intermodal Planning (Larry Saben, PBQ&D)	GDOT has model developed for 1996 Intercity Rail Passenger Plan. Being used by PBQ&D under contract to GDOT.	Model forecasts intercity (60+ mile) passenger trips for auto, air, bus, and rail. Assigns trips to rail network. Highway network not used. The forecasts are not directly comparable with urban area forecasts because of the limitation to long-distance trips that are generally treated as external trips in the urban area models.	The model is not directly suitable for use in the SWTP forecasting, but its results should be checked for general consistency of trends.
HPMS Analysis Package	Office of Planning (Janet Harvey)	FHWA's HPMS Analysis Package produces VMT forecasts. Could be used to help project VMT.	HPMS Analysis Package was only used previously in development of 1995 SWTP. Forecasts are trend-based only.	Probably unsuitable for SWTP update. Use only for comparison with 1995 SWTP.
MTPT	Office of Planning (Ulysses Mitchell)	Forecasting of traffic volumes is one component of MTPT.	Product still in testing. Forecasts made by trend analysis. A simplified forecasting process of VMT based on population and employment growth has been suggested to GDOT which should allow growth factors to be developed based on economic forecasts.	Develop methods to incorporate growth factors based on economic variables to replace trend-based growth factors.

Table 1. Systems and Data Resources Overview (continued)

Systems/Data Resources	Source/Contact	Current Status	Notes	Next Step
Air Quality <i>CS Team Leader: Jack Henneman (Day Wilburn)</i>	Regional mobile source emission models Bob Bowling, Cora Cook, Chris Simons	Only Atlanta has a working emissions model. In anticipation of the eight-hour standard, GDOT has developed models that can be used with the other metropolitan area travel demand models.	DOT provided the TP+ code. Should monitor to ensure consistency with any EPD attainment assumptions. During a review of the code, CS identified an error in the calculation of emission speeds. GDOT has been informed and has revised the code. The process is very similar to the process used in the Atlanta area.	In consultation with GDOT and GEDP, obtain appropriate emission factors for use in SWTP reflecting expected emission controls.
GIS <i>CS Team Leader: Anthony Kroon</i>	Systems Arc/Info ArcView Databases Oracle County Geography Roads, Railroads, Hydrography, Airports, Utilities and Highways State Geography DOT, City, County, RPC, and Militia Boundaries. Digital Orthophotography Quarter Quadrangles (DOQQs). Custom Tools	OIS Georgene Geary, Tracy Leet The team reviewed and cataloged GDOT's GIS data. GDOT's GIS coverages are complete; however, limited transportation planning attribute data exists.	The Office of Information Services manages GDOT's GIS data and systems. Their resources are excellent, mostly used for mapping. Almost any type of roadway data can be mapped. GDOT maintains a mapping Web site, traffic counts and bridge load information are available by location statewide. GDOT's other databases are not accessible through the GIS, and responsibility for database maintenance rests with the individual offices. All GDOT geographic data is submitted to the Georgia GIS Data Clearinghouse www.gis.state.ga.us . The Clearinghouse is the repository for all GIS data statewide.	Monitor current situation and acquire GIS coverages on an as needed basis.

Table 1. Systems and Data Resources Overview (continued)

Systems/Data Resources	Source/Contact	Current Status	Notes	Next Step
Intermodal Systems				
Ports	Georgia Ports Authority, U.S. Army Corps of Engineers	<p>Met with GPA (Jim Bradshaw, Randy Weitman, Rich Cox, Steve Black, et al) to identify data systems and resources.</p> <p>Identified USAACE contact (Susan Durden) and requested recent studies of port activity and navigation channel improvement projects.</p>	<p>GPA studies: Obtained improvement plans for Container Berths 7 and 8 and supporting intermodal railyard. GPA will provide CS with recent landside traffic study (Lockwood-Greene.)</p> <p>GPA databases: GPA maintains data for “over the wharf” tonnage and gate traffic (“Executive Information System”). Data on individual container moves from ship to gate is maintained in “NAVIS” database. Ship Operations maintains a separate database on vessel and berth activity.</p> <p>Some data at www.gaports.com. GPA does not regularly collect data on landside traffic. CS will be able to access these databases as needed.</p> <p>USAACE reports: USAACE produced technical analyses to support the authorization of deepening the Savannah River to 48' and these will be obtained by CS.</p>	Continue data collection from identified sources.
Rail – GDOT State Rail Program	GDOT State Rail Program office, private rail carriers (NS, CSX, Savannah State Docks, Georgia shortlines)	Identified GDOT rail liaison (Hal Wilson). Data to be collected. Copies of GDOT State Rail Program available.	CS will work directly with NS, CSX, Savannah State Docks and the state's other shortlines to obtain corridor-specific and facility-specific volume data where available. GDOT will make available a variety of rail-related reports, databases and models, and will facilitate coordination with the ongoing State Rail Program.	<p>Identify industry contacts in consultation with GDOT. Set meetings with railroads to obtain commodity flow and network information as available.</p>

Table 1. Systems and Data Resources Overview (continued)

Systems/Data Resources	Source/Contact	Current Status	Notes	Next Step
<i>Intermodal Systems (continued)</i>				
Truck/CVO	GDOT, MPO Forecasts, Georgia Motor Trucking Association, secondary sources	To be collected. Initial contact and data request made with GMTA (Ed Crowell).	The state's designated system of NHS routes and intermodal connectors will be used as the defined baseline truck network. To supplement the general commodity flow databases, CS will utilize GDOT and MPO truck forecasts (to the extent these have been developed), way station information, permit enforcement division data, information from the Georgia Motor Trucking Association and prior truck studies from ARC and other regions as available.	Data collection.
Intermodal Management System	Luke Cousins	Under development, not available yet.		Monitor status.
Atlanta Hartsfield Strategic Plan	Hartsfield Airport planning staff	Met with Jaimi Tapp, Airport Planning Manager	Obtained current Master Plan Summary, Aviation Forecasts, Existing Conditions Report and Peak Week Passenger Survey. Monthly data available on passenger, cargo and aircraft operations. No recent ground access data or monitoring program. Info at www.atlmasterplan.com .	CS will maintain regular contact with planning staff.
Airport – plans for general aviation and freight, except Atlanta Hartsfield, can be found in GDOT Aviation Systems Plan (MS Access database)	Ed Ratigan	To be provided to team.	GDOT will provide information on all airports except Hartsfield from its Aviation Systems Plan (which includes freight and passenger forecasts) and MS Access database.	CS will contact GDOT aviation group.

Table 1. Systems and Data Resources Overview (continued)

Systems/Data Resources	Source/Contact	Current Status	Notes	Next Step
Planning & Programming CS Team Leader: Hyun-A Park				
TPRO	OIS (Ted Kowal), Planning (Mike Norris), Office of Programming (Herman Griffin, Meg Pirkle).	In testing mode only, online in early to mid-2000 timeframe. Now due in third quarter of 2000. Contains some very long-term (20+ years) projects, but some shorter-term projects are not included. The six-year CWP and/or STIP can be extracted from T-Pro. There is some project-specific data accessible, but this is not a common feature for all projects.	Provides comprehensive project management capability. Part of TIS released early. T-Pro has been developed to address project tracking needs; this has been specifically tailored for the Office of Programming. The initial release of T-Pro was described as somewhat “rushed,” and the software is not viewed as optimally designed. A new release of T-Pro is due in February; it will incorporate a relational database structure.	Make a formal request to Tim Christian and Ted Kowal for direct access to the database (which is in Oracle).
Public Communications	CS Team Leader: Connie Cooper (Cooper Consulting)			
GDOT Web site	Office of Communications, OIS	Redesign effort underway, Web site is operable as-is for next year or so, links available.	No obstacles to establishing a SWTP Web site link on the GDOT Web site were identified. Existing projects use these links to point to project Web sites, usually hosted by contractors.	Develop initial Web site plan (underway), submit to GDOT for approval. It is assumed that GDOT will host the SWTP Web site.
Mailing lists	Office of Planning, Office of Communications	There are numerous public outreach databases, with names, addresses, phone numbers, etc. Most are in Microsoft Access or other PC database formats. Lists are currently located in several different parts of GDOT.	There is a list of all legislators and city and county officials maintained in a real time basis by the Field districts and Ellis Woodall of Planning. It is in Access format and will be part of TPRO.	The Office of Communications should become the repository for all the various lists. The lists will need to be consolidated and enhanced for project use. The consolidated list will be categorized by affiliation (when available) and county for most records, with more detailed categories for stakeholders. The list will be geocoded to see the distribution across the state.
800-Number	Office of Communications	In use for interchange renumbering project.	Planning to include SWTP menu branch to existing 800-number.	GDOT Planning to coordinate with Office of Communications.

Appendix A

Sample Strategy for Applying Existing Travel Demand Forecasting Resources to Support the SWTP Development

The review of the available data to the Georgia Department of Transportation (GDOT) indicates that the ability to forecast highway demand is well developed in the urbanized areas of Georgia. Of the 12 urbanized areas within Georgia, 10 have traditional travel demand forecasting (TDF) models that are operated by GDOT. Of the two remaining urbanized areas, Atlanta has a TDF model maintained by the Atlanta Regional Commission (ARC) and the Georgia portion of the Chattanooga urbanized area is contained in the TDF model maintained by the Tennessee DOT.

The Atlanta model, befitting the complexity of the largest urban area, has the most fully developed TDF model. The Atlanta model has time-of-day modeling and a mode choice model including a transit network assignment. The other urbanized models do not include mode choice components and instead deal with transit as a fixed percentage of person trips. The majority of the other urbanized models also produce only daily forecasts of highway volumes. All of the models accept as input population, household, and employment variables that would reflect the different economic forecasts, which will be part of the Statewide Transportation Plan (SWTP) update.

Outside of the urbanized areas, GDOT does not have the capability to produce highway forecasts that are sensitive to changes in economic conditions. Forecasts of highway volumes are done primarily through a trend analysis of historical traffic volumes. This produces travel forecasts that are sufficient for project planning, but it does not allow for the policy testing that is to be a part of the SWTP. Georgia DOT has clearly indicated that they do not desire the creation of a sophisticated statewide travel demand forecasting model that would be sensitive to economic policy variables.

A review of other state practices was undertaken to identify a simplified tool that could be used in the analysis of the SWTP and could be easily maintained by Georgia DOT in the future. As discussed in FHWA's Guidebook on Statewide Travel Forecasting,¹ a pure causal variable model was created by the state of Maine to estimate total VMT in the state. Maine fit its VMT model through a linear regression and produced an equation of the form

$$\text{VMT} = 0.015L + 0.332G - 9,600$$

where VMT is in millions of vehicle miles, L is licensed drivers, and G is gross state product in millions of dollars. The linear regression did not include any trend variables, properly reflecting the concept of travel being a derived demand. The model fits the data almost perfectly ($R^2 = 0.995$). The signs of the coefficients for both independent

¹Center for Urban Transportation Studies, University of Wisconsin – Milwaukee; Guidebook on Statewide Travel Forecasting, Federal Highway Administration, March 1999.

variables are intuitively correct, even though the two independent variables are strongly correlated. In order to use this equation, both the number of licensed drivers and the gross state product must be forecasted. Maine could do this themselves with the help of outside agencies. This type of model satisfies the criteria of being able to forecast the effects of different economic forecasts on travel as well as being simple to develop, understand and maintain.

An effort was undertaken to develop such a model for Georgia. Historical information on statewide VMT and licensed drivers for the period of 1980-1997 was readily available from the U.S. DOT², using material submitted by GDOT. Historical information on statewide population for the period 1980-1997 was readily available for the U.S. Bureau of the Census.³ Historical information on statewide employment, income and gross state product for the period 1982-1997 was readily available from the U.S. Bureau of Economic Analysis, as reported through the Selig Center at the University of Georgia.⁴ This information was easily imported into a Microsoft Excel spreadsheet. Using Excel's statistical data analysis capabilities, linear regressions of VMT with various causal variables were produced.

A variety of linear regressions were produced using different combinations of input variables. First, relations between VMT and a single causal variable were examined. Strong correlations were found to exist between the historical statewide VMT and these variables as shown in Table 1. All of the equations are of the form

$$\text{VMT} = \text{Intercept} + \text{Coefficient} * \text{Variable}$$

where VMT is in millions of vehicle miles, and the variable and intercept are as given in Table 1.

²Office of Highway Information Management, Federal Highway Administration, "Highway Statistics Summary to 1995", "1996 Highway Statistics" and "1997 Highway Statistics".

³Population Estimates Branch, U.S. Bureau of the Census: "Intercensal Estimates of the Total Resident Population of States: 1980 to 1990," Census Release date: Aug. 1996; and "ST-99-3 State Population Estimates: Annual Time Series, July 1, 1990 to July 1, 1999," Internet Release Date: December 29, 1999

⁴Bureau of Economic Analysis, U.S. Department of Commerce, "Regional Accounts Data: Gross State Product 1982-1997" as provided by the Selig Center at the University of Georgia.

Table 1. Linear Regression on VMT (in Millions)

Variable	Intercept	Coefficient	R-Squared
Income in Thousand of 1992 \$	26,549	0.00038	0.9889
Population	-76,900	0.02255	0.9805
Employment	-26,494	0.02636	0.9761
Gross State Product (in millions of 1992 \$)	-3,345	0.47709	0.9589
Licensed Drivers	-40,250	0.0250	0.9316

All of the linear regressions produced extremely high correlations with VMT, with R-Squares greater than 0.95 (where 1.0 is a perfect correlation). However, the presence of only one causal variable does not allow for the testing of economic policies that have more than one component (e.g., population and economic growth at different rates such as may occur in a recession). For that reason combination of variables were analyzed as multiple linear regressions. The results are indicated in Table 2. All of the equations are of the form

$$\text{VMT} = \text{Intercept} + \text{Coefficient1} * \text{Variable1} + \text{Coefficient2} * \text{Variable2}$$

where VMT is in millions of vehicle miles, and the variables and intercept are as given in Table 2.

Table 2. Multiple Linear Regression on VMT (in Millions)

Variable 1	Variable 2	Intercept	Coefficient 1	Coefficient 2	R-Squared
Population	Employment	-73,522	0.02104	0.00178	0.9805
Employment	Income	27,935	-0.00112	0.00040	0.9909
Licensed Drivers	Gross State Product	-47,216	0.01982	0.19273	0.9728
Population	Gross State Product	-144,861	0.03861	-0.2411	0.9785

Of the combinations tested, all had extremely high correlation with R-squares greater than 0.97. However, in two of the combinations, one of the variables has a coefficient that is negative, which is not the expected direction. This can be expected when the causal variables are themselves collinear or highly correlated (e.g., income is itself a function of employment). Of the combinations tested, the two sets of variables that produce the highest correlation and have coefficients in the expected direction are population together with employment and licensed drivers together with Gross State Product. The latter is the same form of the equation developed by the Maine DOT. The regression of population and employment was performed for the period 1970-1997. The regression of licensed drivers and GSP was only performed for the period 1982 to 1997, due to the limited availability of GSP data.

It is recommended that for purposes of the development of the Georgia SWTP, the linear equation of VMT as a function of population and employment be utilized because of its high correlation over a longer period of time. The forecasts of these causal variables will be part of the economic forecasts. The statewide VMT forecasts can be utilized by themselves as performance measures. Alternatively, the urbanized area TDF models could be used to produce the VMT forecasts for their respective urbanized areas and the remainder from the statewide VMT forecast, after subtraction of these urbanized VMT forecasts, could be used as the non-urban VMT forecast for Georgia.

Proposed VMT Forecasting Equation

$$VMT = 0.021P + 0.0018E - 73,500$$

Where VMT is the annual VMT in millions and P is the state population and E is the state employment.